MaxEnt for Camera-trap Data?

Presence Only Data

- Impossible to make reliable inferences about distribution or habitat preferences without knowledge of sampling scheme.
  - need to know what areas have been searched and the species not found.
- Methods that generate 'pseudo-absences' tend to rely on some strong assumptions.

Presence Only Data

- Limited options for historical data sets.

- Should be advocating at least presence-absence data be recorded.

- Information that allows detection to be estimated would be even better.

Presence Only Data

- Thought experiment:
  - 10 presence's in habitat A, 20 in habitat B
  - Which habitat is 'better'?

MaxEnt

- Technique developed for presence-only data around the concept of "maximum entropy"

  e.g., Phillips et al. 2006. Ecological Modelling

- MaxEnt is user (too) friendly software that has been developed

MaxEnt

- Variety of model building and output options

- How well does approach work when we know 'truth'?

- Focused on 'logistic' option as claim is it has analogous interpretation to logistic regression
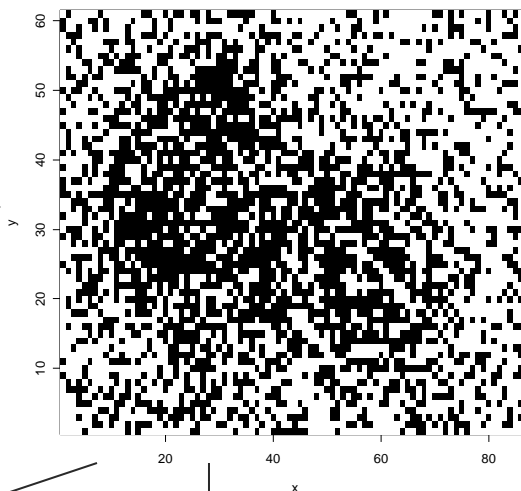
MaxEnt Test

- For a real landscape (5307 units or pixels), assume species prefers higher elevations
  - defined according to logistic model

- Generate a 'realised' distribution

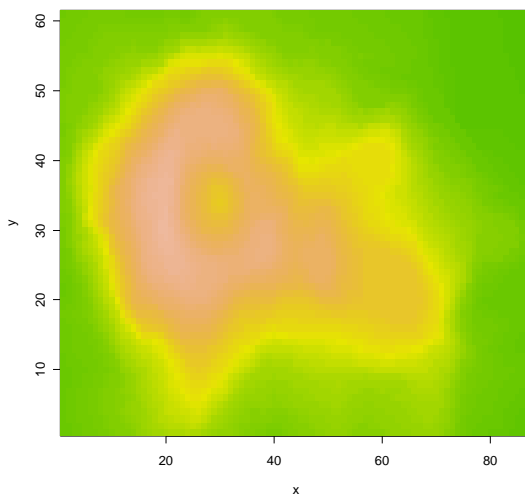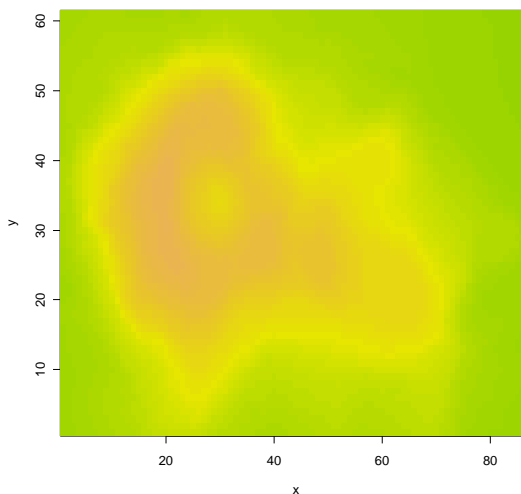- Compare output from logistic regression and MaxEnt

MaxEnt Test

Truth
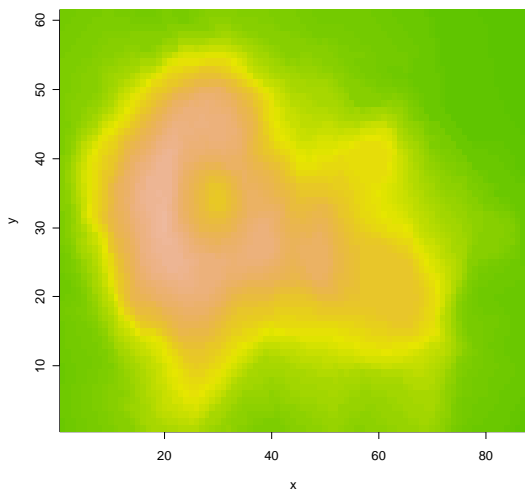
RD
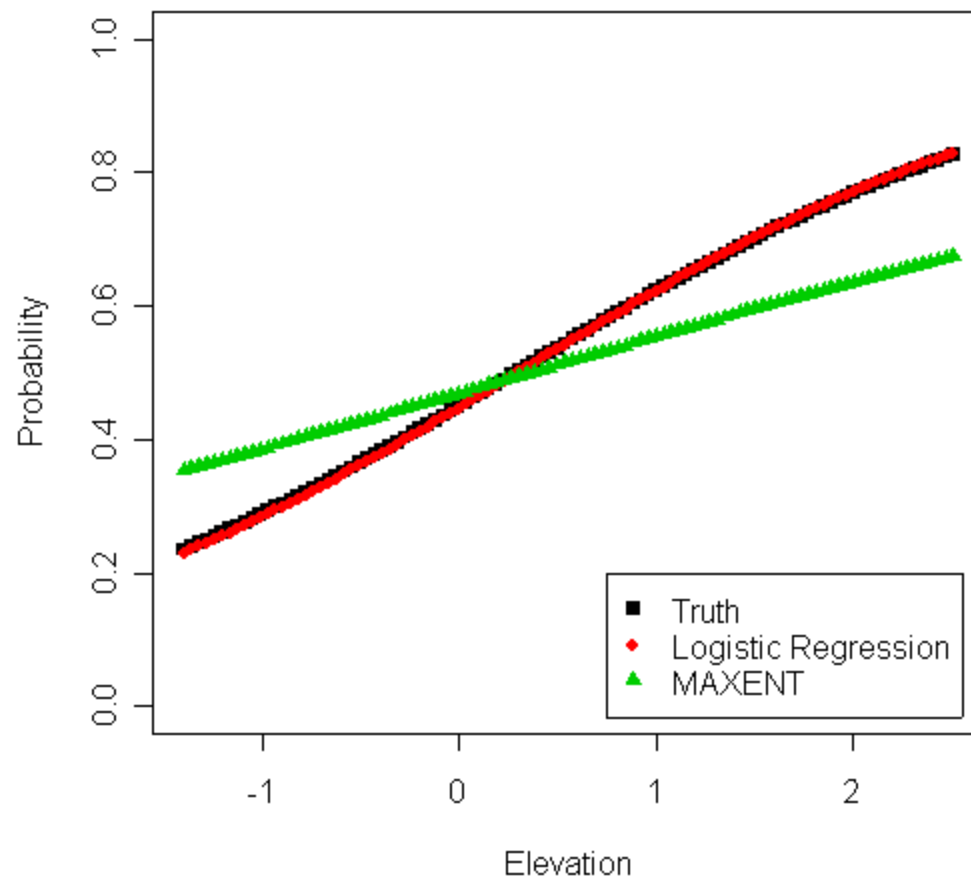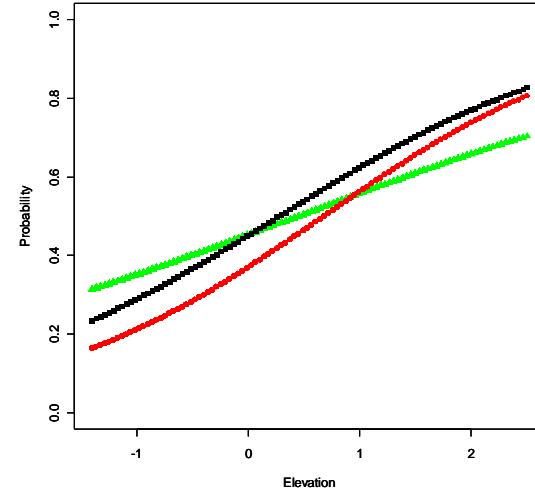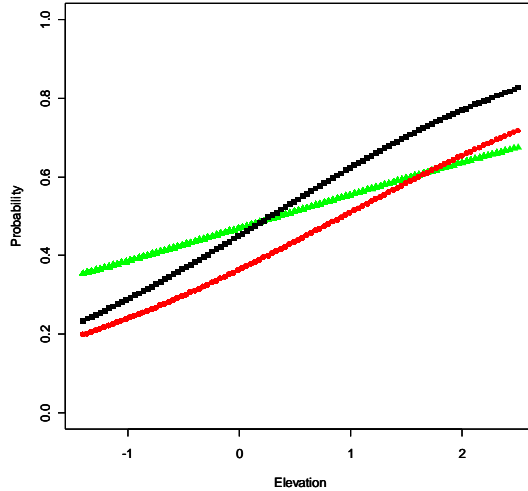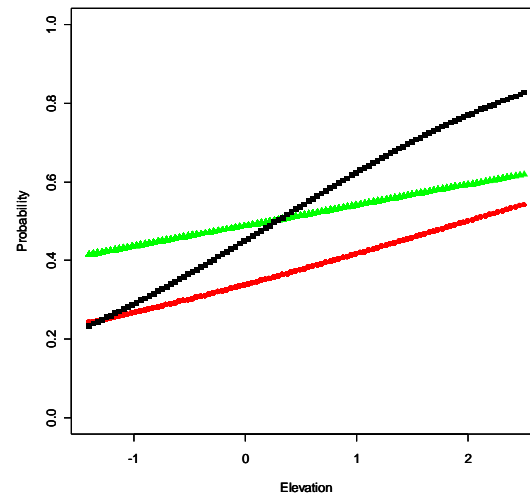
LR

MaxEnt

MaxEnt Test
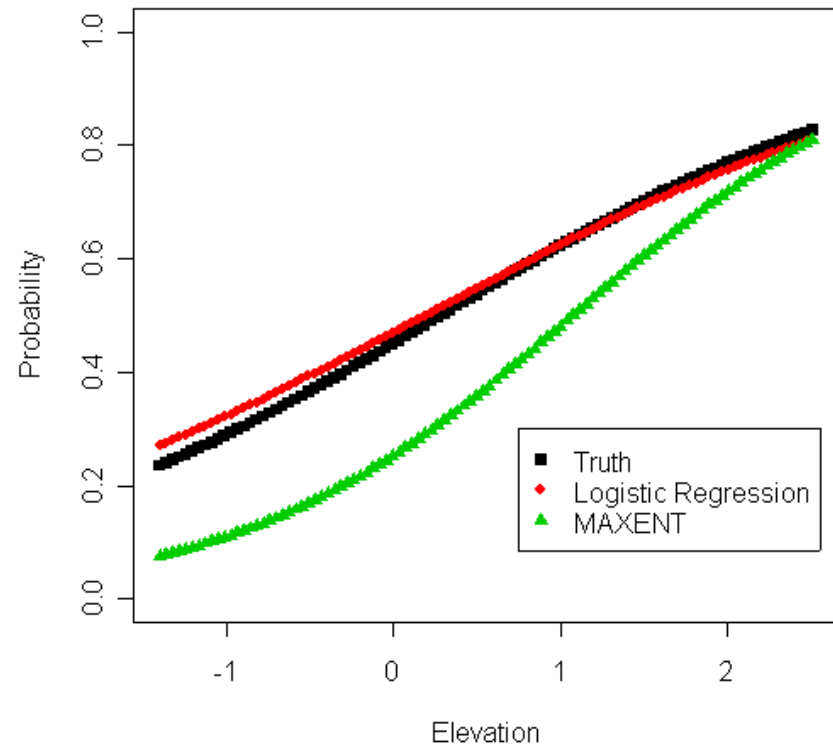
MaxEnt Test – imperfect detection

Constant

Increasing

Decreasing

MaxEnt Test – non-random sampling

- Sampling scheme correlated with factor of interest

  ○ Only sampling elevations >0

  ○ Similar to only having records near urban areas or development

MaxEnt Test

- MaxEnt does not do a good job of approximating 'truth' under some circumstances
  - Strongly suspect that any method based on presence-only data will have similar problems

- Simple logistic regression also fails with imperfect detection

Summary

- Always try to obtain both presence and absence data

- Always try to use inference method that incorporates detection probabilities <1 (e.g., occupancy modeling)